

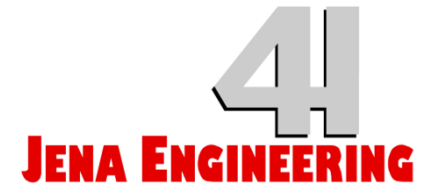
# Customized solutions and new aspects in environmental monitoring from a single source

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# The -4H- JENA company

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- Headquarter in Jena
- Branch office in Kiel
- In sum 36 employees
- 3 divisions:
  - Optical inspections and metrology
  - Industrial services, construction and production
  - Maritime technologies

# Maritime technologies -portfolio-

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- -4H- FerryBoxes (different types, individually customized)
- Environmental monitoring containers
- Time-series station
- Mesocosm installation and control
- Seawater distribution system for labs on research vessel
- Freshwater monitoring systems
- Environmental buoy systems
- Underwater nodes
- Passive sampler and litter sampler (e.g. micro plastics)



**Multiple and versatile solutions from a single source**

# -4H- FerryBox



Without anti-fouling for 4 weeks  
Reliable anti-fouling  
due to no tap water and acid  
system for months

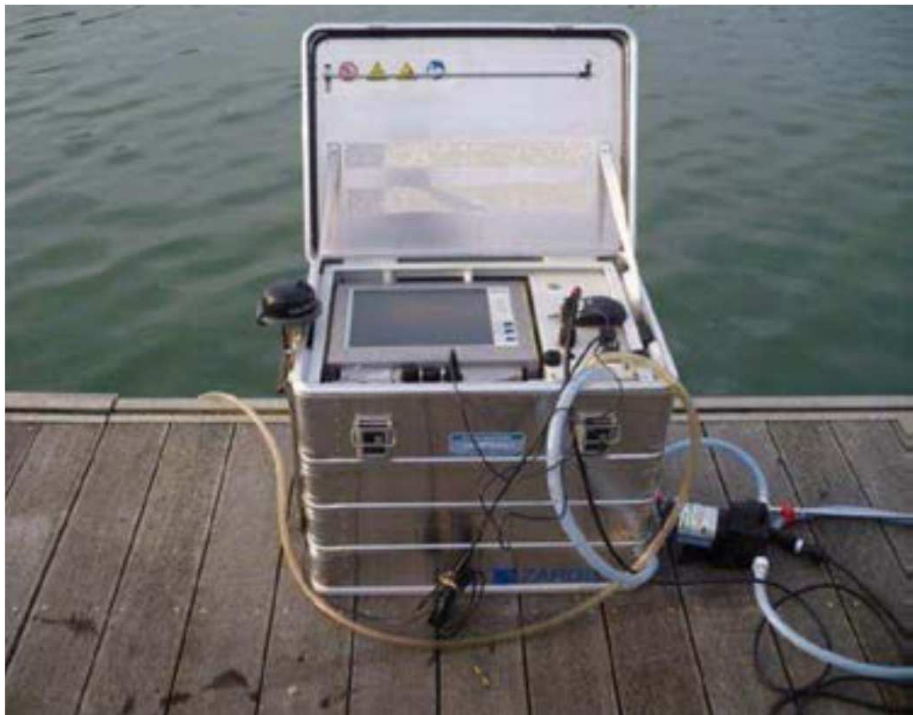
# -4H- FerryBox



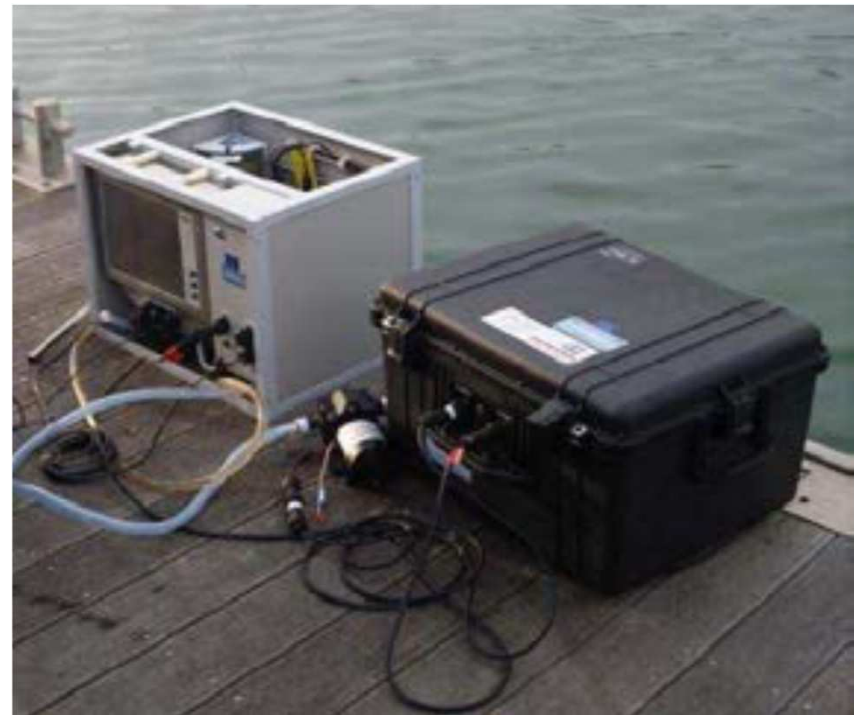
@ Coast guard ship „Zirfaea“, Rijkswaterstaat, NL

# -4H- PocketFerryBox

## The mobile solution



...flexible and usable „everywhere“...



...with external battery pack (car batteries)

# Individual boxes



- Control and data storage of a multi-parameter probe
- Triggered by flow-control
- Tailored design for Damen Ship Yard, NL

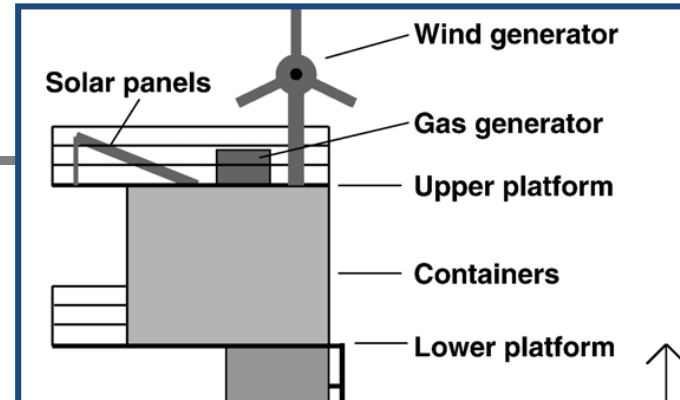
# -4H-Environmental Observing Container

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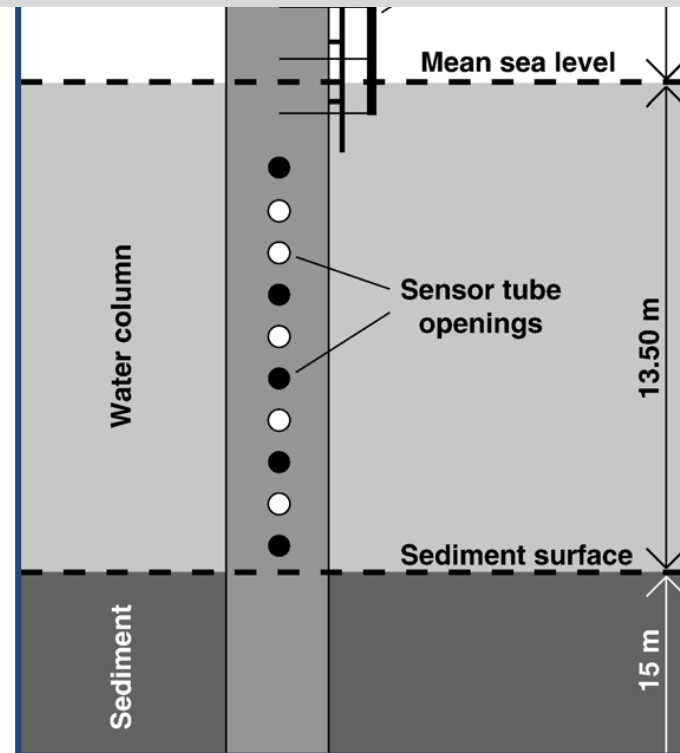
- Hosts a -4H-FerryBox and additional systems (sampler, sediment trap, nutrient analyzers, fridge...)
- Meteorological parameters from the roof
- Designed for autonomous environmental monitoring on ships, rivers, estuaries, coastlines, harbors and lakes
- Telemetry, remote control, data transmission
- Ready to operate - plug and play with external water and power connection



# Time-series station

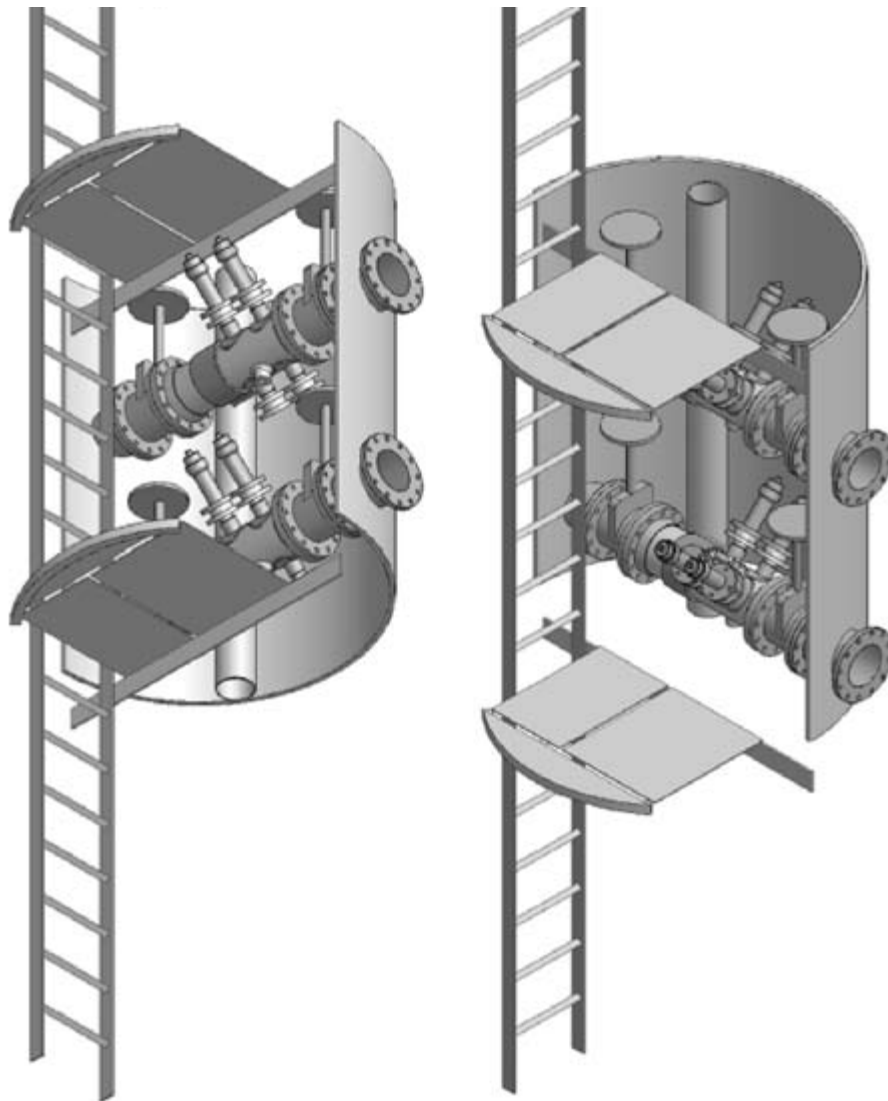


In operation since autumn 2002.  
Sensors renewed in 2013.



Grunwald et al. (2007), Marine Chemistry  
Reuter et al. (2009), Ocean Dynamics

# Time-series station



- Flow tubes for sensor installation
- Direction of the tubes according to flow direction of the tides
- Tubes are accessible and lockable from inside the pole

- 12 basins (1200 L each)
- **Control of:**
  - Tides
  - Currents (bi-directional)
  - Temperature (daily and annual cycle simulation)
  - pH by changing CO<sub>2</sub> conc.
- **Sensors for:**
  - Temperature
  - Salinity
  - pCO<sub>2</sub>
  - pH
  - Diss. oxygen
  - Turbidity
  - Chlorophyll-a



# Seawater distribution for labs on research vessel R/V Sonne



- Different suction positions at the ship's hull
- Supply of pure seawater to different labs onboard
- Pressure and flow control
- Special debubbling system
- Online measurements: intake temperature, salinity (conduct.), chl-a, algae groups, and yellow substances

# Freshwater quality monitoring panel

## -4H- AquaControl



- Sensors for:
  - pH
  - Temperature
  - Chlorine
  - Turbidity
  - Flow(additional on request, up to 16)
- Integrated data logging

# Buoy



## Power by

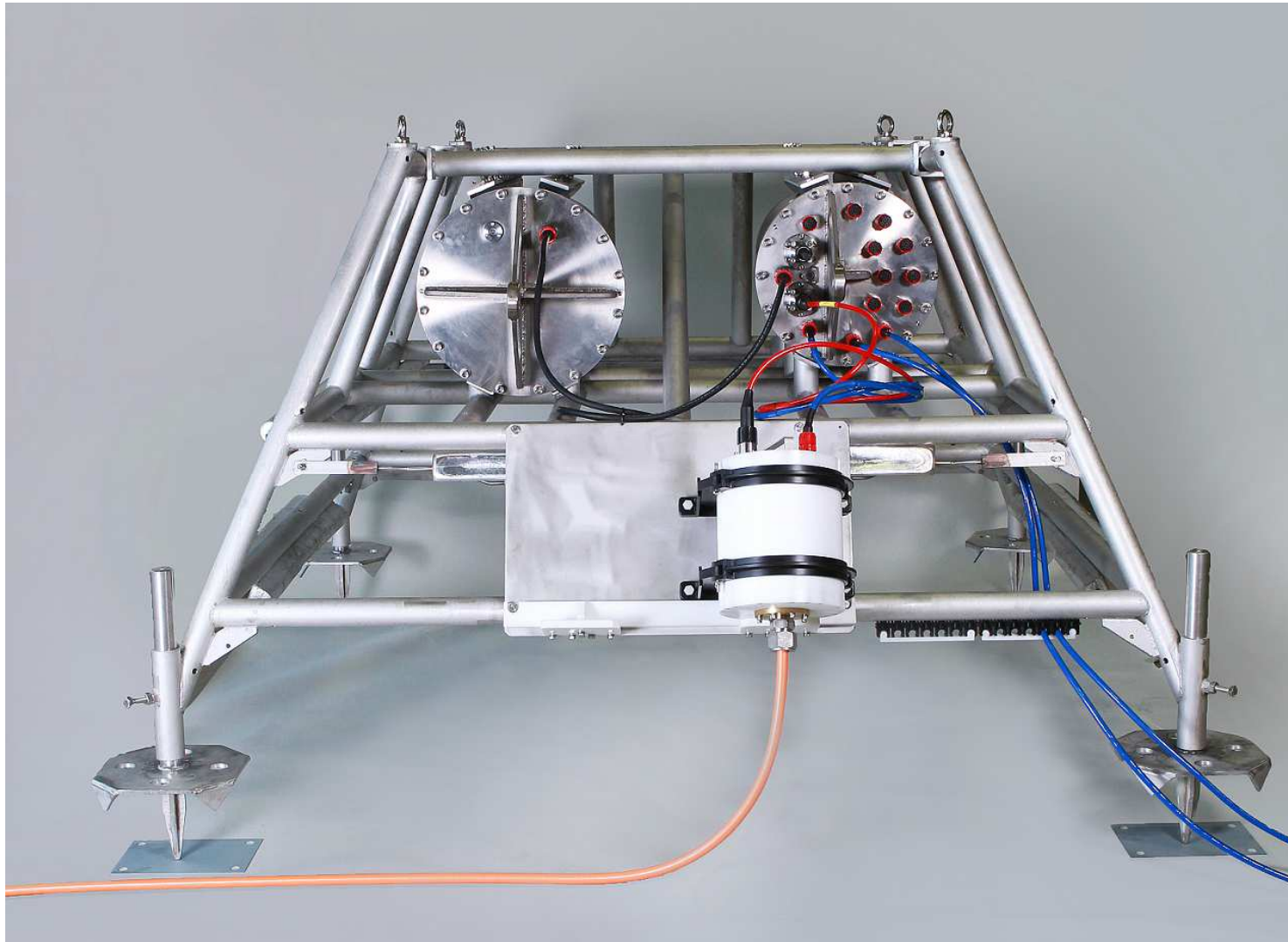
- Solar panels
- Wind generator
- Fuel cell



Self sustained surface and cable connected seafloor measurements.

Plan: Connection to an underwater node

# Underwater Node



In cooperation with COSYNA, AWI, loth engineering

[www.cosyna.de](http://www.cosyna.de)

# Underwater Node

- Up to 10 km from shore
  - Up to 1250 W power consumption
  - 10 sensor systems per node
  - Max. 3 nodes connected in series → max. 30 km distance to shore
  - Gbit fibre-optic cable for data transfer
  - Separated virtual networks for each sensor system (can be combined)
  - Users can operate their sensors as they are besides them in the office (Access from anywhere in the world via internet is possible)
  - Each individual sensor can be checked and re-adjusted by remote control from outside (sensor dependent)
  - Data storage and forwarding by land station
- @ MarGate, 800m off Helgoland, 12m water depth



# Passive sampler



# Plankton and litter sampler

**Thank you.**

